

Ms. Pat Murrow  
RCRA Permits and Compliance Branch  
U.S. Environmental Protection Agency  
Region VII  
11201 Renner Boulevard  
Lenexa, Kansas 66219

Subject:  
RFI/CMS Quarterly Progress Report No. 122  
5200 Speaker Road  
Kansas City, Kansas

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ENVIRONMENTAL

Date:  
October 6, 2017

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Our ref:  
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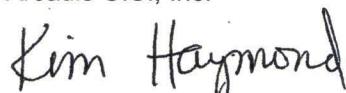
Dear Ms. Murrow:

On behalf of Harcros Chemicals Inc., T H Agriculture & Nutrition, L.L.C., and Elementis Chemicals, Inc., we are enclosing three copies of the quarterly progress report for the RCRA Facility Investigation/Corrective Measures Study at the 5200 Speaker Road facility in Kansas City, Kansas. This progress report addresses the July through September 2017 reporting period, and also responds to EPA's comments on Quarterly Progress Report No. 121 for the April through June 2017 reporting period.

Please do not hesitate to contact me at 913-998-6920 if you have any questions or comments.

Sincerely,

Arcadis U.S., Inc.



Kim Haymond, P.E.  
Project Manager

Copies:

Everett Spellman, KDHE  
Jay Smith, Philips North America  
Anna Kunkel, Philips North America  
Jack Cleary, Harcros Chemicals Inc.  
Michael Potts, Ramboll Environ

RCRA



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**QUARTERLY PROGRESS REPORT NO. 122**  
**JULY - SEPTEMBER 2017**

**RCRA FACILITY INVESTIGATION/CORRECTIVE MEASURES STUDY**  
**5200 SPEAKER ROAD**  
**KANSAS CITY, KANSAS FACILITY**  
**EPA Docket No. VII-90-H-0028**

This progress report summarizes completed activities and upcoming tasks for the RCRA Facility Investigation/Corrective Measures Study at the 5200 Speaker Road facility in Kansas City, Kansas. In accordance with the Administrative Order on Consent, progress reports are submitted on a quarterly basis. This report addresses the period of July through September 2017.

**I. WORK COMPLETED AND ACTIVITIES CONDUCTED**

**Work Directly Related to the Administrative Order on Consent**

**• Soil Vapor Extraction Systems, Mid-Area and West Tank Dike**

Operation of the Mid-Area and West Tank Dike SVE systems continued during this reporting period. System downtime was related to routine maintenance and general power interruptions/outages.

Both portions of the SVE system continue to remove VOC's from the subsurface. A combined total of 34,768 pounds of VOC's is estimated to have been removed via the SVE system through September 2017.

The Mid-Area SVE system has been operating for close to 16 years and the West Tank Dike system was placed in service almost 12 years ago. A system evaluation performed in late 2009/early 2010 showed the SVE system has been very effective in source reductions, reducing both VOC concentrations and the size of the impacted areas. The current system operation combines pulsed operation at wells with asymptotic concentrations of VOC's in the vapor, turning off wells with no detections, and continuing to operate the wells in the areas with the highest remaining concentrations as reported in the letter submitted to EPA on June 18, 2010.

**• Groundwater Sampling and Analysis**

Groundwater sampling pursuant to the revised monitoring program for the stabilization system will be conducted in October 2017.

A tabular summary of the results for the April 2017 monitoring event, updated to include results for wells MW-6, MW-7, MW-41D, and MW-42D, was provided electronically to EPA on July 25, 2017 and is attached to this progress report. These data continue to indicate no exceedances of MCL's in the performance monitoring wells.

The potentiometric contour figures and water level tables for the April 2017 monitoring event have been revised based on the August 23, 2017 comment letter from EPA. The water levels for piezometers P11, P12, and P13 were moved to the deep zone potentiometric contour map. The water level table was revised to add the total depth and screen interval information. Notes have also been added to the water level table regarding wells MW-24S, MW-26S, and MW-34D and the operational status of EW-1 and EW-2 at the time of the water level readings. The revised figures and table are attached, along with the well construction logs for MW-9D, MW-20D, MW-27S, and MW-30S and the boring logs for MW-9D, MW-20D, MW-27S, MW-30S, and MW-37S. The boring log for MW-31S has been archived by Burns & McDonnell. It is being retrieved and will be submitted to EPA once it is available.

The current groundwater monitoring program is performed on a semi-annual basis (approved by the EPA in a letter received on July 8, 2011) and the wells included in the sampling program are in accordance with the response letter from EPA dated September 21, 2016, approving the termination

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of EW-1 operation based on the continued monitoring of a certain set of monitoring wells. EPA has completed its review of the groundwater monitoring program.

- **Hydraulic Control of Groundwater**

Activities during this reporting period were focused upon operation, monitoring, and maintenance of the groundwater stabilization system for the primary and southern plumes. Historically, the groundwater stabilization system included the operation of extraction wells EW-1 and EW-2; however, EPA approved the termination of EW-1 operations in a letter received on September 21, 2016, premised on the continued monitoring of a certain set of monitoring wells. Operation of EW-1 ended on July 6, 2016 and the well is currently not operating.

EW-1 operated from 2002 through July 6, 2016 and a total of 417,265,000 gallons of groundwater were extracted by EW-1. EW-2 has been operating since 2004. Therefore, a total of 349,145,000 gallons have been extracted by EW-2, for a total of 766,410,000 gallons of groundwater extracted and treated through September 2017.

Operation of the treatment system continued to be impacted by naturally occurring substances in the groundwater. Iron and other minerals are clogging bag filters and various treatment system components, and creating pressure problems across the carbon vessels which automatically shut the system down. Daily bag filter changes were required to maintain system operation, and acid cleanings were required due to scaling in the discharge pump casing and on the impeller. Maintenance this quarter also included weekly acid cleanings on the air stripper, discharge pump and associated inlet and outlet valves to remove excess scale. Bag filters were replaced and carbon backwash events took place monthly.

Sampling of the treatment system effluent was performed in this reporting period per the terms of the NPDES permit. Monthly monitoring reports were submitted to KDHE by the 28<sup>th</sup> day of the month following each sampling period, with copies routed to EPA. The monthly monitoring data indicate continued compliance with discharge permit limits.

The current NPDES permit was issued by KDHE on April 14, 2017 and is effective through December 31, 2021.

**Southern Plume Source Characterization and Remediation**

A response to EPA's comments and specific requests for additional vapor related sampling (May 19, 2008) was previously submitted on June 20, 2008. On July 11, 2008, Harcros Chemicals Inc. (Harcros) provided EPA with the requested additional information on their operations and the applicability of OSHA to the warehouse and office buildings. EPA requested further information on Harcros operations in their correspondence dated October 24, 2008. A response to this request was submitted by Harcros on February 26, 2009.

It remains our position that the Harcros warehouse and office building are active workplaces governed by OSHA, that acceptable workplace exposure levels are set by promulgated PEL's, that no further investigations are warranted, and that remediation should be implemented. Installation and operation of the SVE/ART and subslab vapor remediation systems has proceeded in order to reduce the residual source area concentration of VOC's and corresponding areas of impacted subsurface vapors and groundwater.

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- Operation of the SVE and subslab vapor remediation systems at the warehouse continued during this reporting period. System downtime was associated with routine maintenance and general power outages/interruptions.
- The warehouse remediation systems continue to remove VOC's from the subsurface. System performance monitoring indicates that approximately 505 pounds of VOC's have been removed from this area through September 2017.
- The Underground Injection Control (UIC) permit and its associated modifications for full-scale molasses injections and to re-inject treated groundwater were approved by KDHE on August 29, 2014. A reply from EPA to KDHE confirming there are no objections was sent on May 17, 2013. Operation of this system began in July 2015. Monthly monitoring reports are submitted to KDHE in accordance with the terms of the UIC permit with copies routed to EPA.
- Performance monitoring of the Southern Plume ERD was conducted on July 12, August 17, and September 8, 2017. A tabular summary of the results received to date for these monitoring events is attached to this progress report. Performance monitoring events will continue in the third quarter of 2017.

**Other Work Completed**

- The semi-annual groundwater monitoring of the Closed Surface Impoundment will be conducted concurrently with the October 2017 RCRA sampling event.
- Due to Harcros' operational needs, renovations to the rail line through three areas of the facility, Western Area, Mid-Area, and Restricted Zone, are planned. However, remaining questions regarding the waste classification of any dioxin-impacted soils that could be removed during the proposed Harcros rail work are currently hampering the implementation of these renovations. Discussions regarding waste characterization have been ongoing with the EPA since November 2014. A response letter regarding waste characterization was received from EPA on June 13, 2017. An initial discussion on the waste characterization letter was conducted during the June 22, 2017 meeting with the EPA.

Based on Harcros' operations, the timing of the renovations is such that the Western Area needs to be performed before the Restricted Zone and Mid-Area. Below is the current status for each of these rail areas:

- **Western Area:** A work plan specific to the Western Rail excavation work and an updated site-wide Sampling and Analysis Plan and Quality Assurance Project Plan were submitted to EPA on December 16, 2016. This work plan was based on the discussions and results of various meetings and documents since December 2014. Comments on the December 2016 Work Plan, SAP, and QAPP were received from EPA on June 13, 2017 and discussed with EPA during a meeting held on June 22, 2017. A response to comment letter along with a revised Work Plan was submitted to EPA on July 31, 2017. A response to comment letter along with a revised SAP and QAPP was submitted to EPA on August 30, 2017.
- **Restricted Zone:** Due to Harcros' operational needs, a voluntary surface soil sampling plan for the western portion of the Restricted Zone was developed in January 2017. Approval for the planned subsurface activities within the Restricted Zone was received from KDHE. A response to Harcros' notice of intent to sample was received from EPA on February 10, 2017. Currently, the work is delayed until waste characterization can be determined.

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- **Mid-Area:** Soil samples were collected from the Mid-Area of the facility from November 5-12, 2013 and analyzed for VOCs, pesticides and dioxins. A work plan for the planned excavation work in the Mid-Area was prepared and submitted to EPA and KDHE on November 4, 2014. A meeting was held with EPA and KDHE on December 5, 2014, to discuss the planned Mid-Area excavation work and management of waste that will be generated during excavation. Currently, the work is delayed until waste characterization can be determined.

## **II. SUMMARY OF FINDINGS**

An estimated 35,270 pounds of VOC's have been removed by the combined SVE and warehouse remediation systems to date. The SVE system has been very effective in source reductions, reducing both VOC concentrations and the size of the impacted areas. With these reductions, the system operation has been modified to turn off or pulse-operate selected wells and increase the system efficiency in removing any remaining mass.

Approximately 766,410,000 gallons of groundwater have been extracted, treated, and discharged in accordance with NPDES permit limits since startup of the groundwater stabilization systems for the primary and southern plumes.

The groundwater monitoring results indicate that the stabilization system and ongoing in-situ processes have been effective in preventing migration of impacted groundwater from the primary plumes into uncontaminated areas above MCL's. The concentrations of CVOC's in subsurface soils and groundwater near the Harcros warehouse will continue to be reduced through operation of the SVE/ART, subslab, and ERD remediation systems.

## **III. SUMMARY OF PROBLEMS OR POTENTIAL PROBLEMS ENCOUNTERED**

Remaining questions regarding classification of any dioxin-impacted soils removed during the proposed Harcros rail work and/or remediation in other areas of the site are currently hampering the development of a draft CMS addendum for surface soil and finalization of a draft Statement of Basis for the site remedy.

## **IV. PROJECTED WORK FOR THE NEXT REPORTING PERIOD**

### **Work Related to the Administrative Order on Consent**

- Operation of the SVE systems in the Mid-Area and West Tank Dike area will continue in accordance with the permit from the Unified Government. Performance monitoring will continue in the next quarter.
- The extraction, treatment, and discharge system providing stabilization of the southern area impacts to groundwater via EW-2 will continue to operate. Activities to address the operational problems caused by iron and other naturally occurring substances will continue. Other routine operation and maintenance activities will be performed as needed. Performance monitoring of the groundwater treatment system will continue.
- NPDES monitoring and reporting will continue in accordance with the terms of the NPDES permit.
- Semi-annual groundwater sampling to monitor the stabilization system performance will be conducted the week of October 16, 2017.

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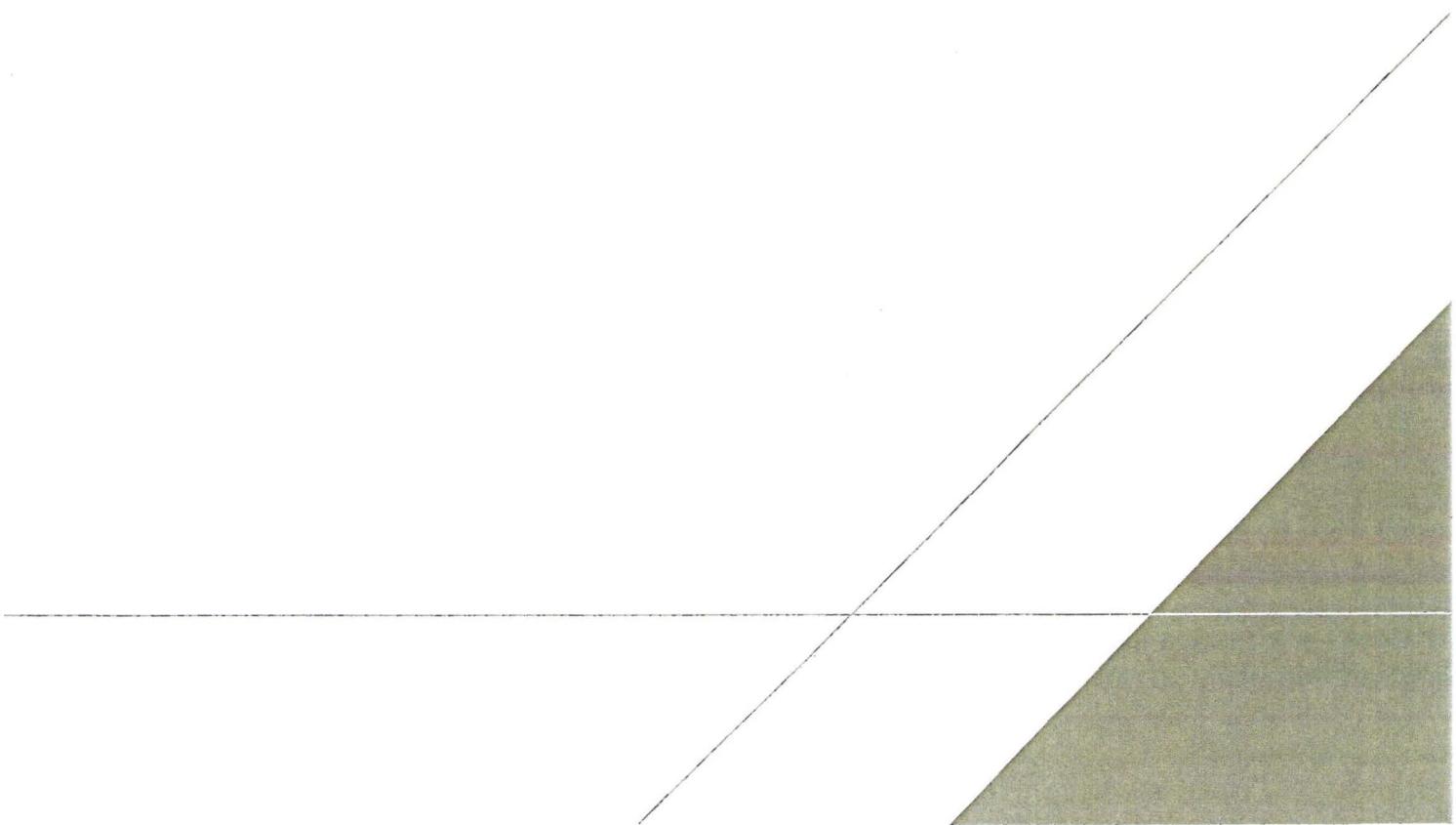
**Southern Plume Source Characterization and Remediation**

- Operation and performance monitoring of the warehouse SVE and subslab remediation systems will continue.
- The post-injection monitoring program for the ERD system will continue. Sampling data will be submitted to EPA in the quarterly progress reports.
- Operation of the extraction and re-injection wells will continue.
- UIC monitoring and reporting will continue in accordance with the terms of the UIC permit.

**Other Work**

- Semi-annual groundwater monitoring of the Closed SI will be conducted concurrently with the October groundwater stabilization system sampling event.
- The results of the semi-annual monitoring will be submitted with the next EPA quarterly progress report.
- Awaiting comments from EPA on the following submitted documents: Western Rail Soil Removal Work Plan, SAP, QAPP, and Scrubber Foundation Special Waste Request.
- An in-person meeting will be held with EPA on November 3, 2017 to discuss the status of the Western Rail Soil Removal Work Plan, SAP, QAPP, special waste requests, and potential options for the on-site surface soil. The timing of the CMS addendum is pending the discussions and conclusions reached at the upcoming meeting.

## TABLES



**FINAL ANALYTICAL RESULTS**  
**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	MW-1S <sup>(SI)</sup>		MW-1S(R) <sup>(SI)</sup>		MW-2D <sup>(SI)</sup>		MW-202D <sup>(SI)</sup>		MW-6		MW-7		MW-10		Rep. Limit	
	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note		
<b>Volatile Organics (ug/L)</b>																
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethene (total)	--	ND	U	1.0	ND	U	1.0	0.62	J	1.0	0.61	J	1.0	0.97	J	1.0
Acetone	--	ND	U	10	ND	U	10	ND	U	10	4.1	J	10	2.9	J	10
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chlorobenzene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.34	J	1.0
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloromethane	--	ND	UF2	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
cis-1,2-Dichloroethene	70	ND	U	1.0	ND	U	1.0	0.62	J	1.0	0.61	J	1.0	0.97	J	1.0
Ethylbenzene	700	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Methylene chloride	5.0	ND	U	2.0	ND	UB	2.0	ND	UB	2.0	ND	UB	2.0	ND	U	2.0
Tetrachloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Toluene	1,000	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
trans-1,2-Dichloroethene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Trichloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Vinyl chloride	2.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.15	JF2	1.0
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
<b>Dissolved Gases (ug/L)</b>																
Ethane	--	NA		NA		NA		NA		NA		NA		NA		
Ethene	--	NA		NA		NA		NA		NA		NA		NA		
Methane	--	NA		NA		NA		NA		NA		NA		NA		
<b>General Chemistry (mg/L)</b>																
Total Organic Carbon - Average	--	NA		NA		NA		NA		NA		NA		NA		

**Notes**

Shaded wells are part of the groundwater stabilization performance monitoring well network.

(SI) = Closed Surface Impoundment Wells

(W) = Warehouse performance monitoring wells

(P) = Southern Plume ERD Performance monitoring wells

Duplicate: MW-202D = MW-2D; MW-243D = MW43D; BMW-203D = BMW-3D; IW204 = IW-04

Trip Blanks: TB-01(042517); TB-01(042817)

Rinsate: MW-01S(042817)R; MW-48S(042717)R

NA = Not Analyzed

U = Not Detected at or above RL

J = Estimated result less than RL

B = Blank contamination

F1 = Matrix Spike/Matrix Spike Recovery is outside acceptance limits

F2 = Matrix Spike/Matrix Spike Duplicate relative percent difference exceeds control limits

MCL = USEPA Maximum Contaminant Level for Drinking Water

**FINAL ANALYTICAL RESULTS**  
**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	MW-11B <sup>(SI)</sup>		MW-11D <sup>(SI)</sup>		MW-12 <sup>(SI)</sup>		MW-14 <sup>(SI)</sup>		MW-17SA		MW-17D		MW-20S <sup>(P)</sup>		Rep. Limit	
	Result	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Result	Note		
<b>Volatile Organics (ug/L)</b>																
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethene (total)	--	ND	U	1.0	<b>0.55</b>	J	1.0	<b>9.5</b>		1.0	<b>0.30</b>	J	1.0	<b>0.43</b>	J	1.0
Acetone	--	ND	U	10	ND	U	10	ND	U	10	ND	U	10	<b>5.6</b>	J	10
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chlorobenzene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloromethane	--	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
cis-1,2-Dichloroethene	70	<b>0.18</b>	J	1.0	<b>0.55</b>	J	1.0	<b>9.5</b>		1.0	<b>0.30</b>	J	1.0	<b>0.43</b>	J	1.0
Ethylbenzene	700	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Methylene chloride	5.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	UB	2.0	ND	U	2.0
Tetrachloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Toluene	1,000	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
trans-1,2-Dichloroethene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Trichloroethene	5.0	ND	U	1.0	ND	U	1.0	<b>0.30</b>	J	1.0	ND	U	1.0	<b>0.77</b>	J	1.0
Vinyl chloride	2.0	ND	U	1.0	<b>0.23</b>	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
<b>Dissolved Gases (ug/L)</b>																
Ethane	--	NA		NA		NA		NA		NA		NA		NA		NA
Ethene	--	NA		NA		NA		NA		NA		NA		NA		NA
Methane	--	NA		NA		NA		NA		NA		NA		NA		NA
<b>General Chemistry (mg/L)</b>																
Total Organic Carbon - Average	--	NA		NA		NA		NA		NA		NA		NA		NA

**Notes**

Shaded wells a

(SI) = Closed Surface Impoundment Wells

(W) = Warehouse performance monitoring wells

(P) = Southern Plume ERD Performance monitoring wells

Duplicate: MW-202D = MW-2D; MW-243D = MW43D; BMW-203D = BMW-3D; IW204 = IW-04

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**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	MW-22D		MW-31S		MW-35S <sup>(SI)</sup>		MW-36S		MW-36D		MW-41D		MW-42D		Rep. Limit	
	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note		
<b>Volatile Organics (ug/L)</b>																
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethene (total)	--	0.73	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	23	1.0	1.0
Acetone	--	ND	U	10	ND	U	10	ND	U	10	4.0	J	10	2.0	J	10
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chlorobenzene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloromethane	--	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
cis-1,2-Dichloroethene	70	0.73	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	22	1.0	1.1
Ethylbenzene	700	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Methylene chloride	5.0	ND	U	2.0	ND	U	2.0	ND	UB	2.0	ND	U	2.0	ND	U	2.0
Tetrachloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Toluene	1,000	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
trans-1,2-Dichloroethene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.51	J	1.0
Trichloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.21	J	1.0
Vinyl chloride	2.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.58	J	1.0
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
<b>Dissolved Gases (ug/L)</b>																
Ethane	--	NA			NA			NA			NA			NA		NA
Ethene	--	NA			NA			NA			NA			NA		NA
Methane	--	NA			NA			NA			NA			NA		NA
<b>General Chemistry (mg/L)</b>																
Total Organic Carbon - Average	--	NA			NA			NA			NA			NA		NA

**Notes**

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(SI) = Closed Surface Impoundment Wells

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(P) = Southern Plume ERD Performance monitoring wells

Duplicate: MW-202D = MW-2D; MW-243D = MW43D; BMW-203D = BMW-3D; IW204 = IW-04

Trip Blanks: TB-01(042517); TB-01(042817)

Rinsate: MW-01S(042817)R; MW-48S(042717)R

NA = Not Analyzed

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F1 = Matrix Spike/Matrix Spike Recovery is outside acceptance limits

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**FINAL ANALYTICAL RESULTS**  
**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	MW-43D		MW-243D		MW-44D		MW-46S		MW-47S		MW-47D <sup>(W)</sup>		MW-48S <sup>(W, P)</sup>					
	Result	Note	Rep. Limit	Note	Rep. Limit	Note												
<b>Volatile Organics (ug/L)</b>																		
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
1,2-Dichloroethene (total)	--	10		1.0	10		1.0	0.36	J	1.0	ND	U	1.0	0.66	J	1.0		
Acetone	--	ND	UF2	10	ND	U	10	ND	U	10	3.0	J	10	ND	U	10		
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Chlorobenzene	100	0.38	J	1.0	0.39	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Chloromethane	--	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0		
cis-1,2-Dichloroethene	70	10		1.0	10		1.0	0.36	J	1.0	ND	U	1.0	0.23	J	1.0		
Ethylbenzene	700	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Methylene chloride	5.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0		
Tetrachloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Toluene	1,000	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
trans-1,2-Dichloroethene	100	0.30	J	1.0	0.29	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Trichloroethene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Vinyl chloride	2.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0		
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0		
<b>Dissolved Gases (ug/L)</b>																		
Ethane	--		NA		NA		NA		NA		ND	U	5.0	NA		ND	U	5.0
Ethene	--		NA		NA		NA		NA		ND	U	5.0	NA		ND	U	5.0
Methane	--		NA		NA		NA		NA		590		5.0	NA		350		5.0
<b>General Chemistry (mg/L)</b>																		
Total Organic Carbon - Average	--		NA		NA		NA		NA		4.1		1.0	NA		3.9		1.0

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Duplicate: MW-202D = MW-2D; MW-243D = MW43D; BMW-203D = BMW-3D; IW204 = IW-04

Trip Blanks: TB-01(042517); TB-01(042817)

Rinsate: MW-01S(042817)R; MW-48S(042717)R

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**FINAL ANALYTICAL RESULTS**  
**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	MW-48S(R) <sup>(W, P)</sup>		MW-48D <sup>(W)</sup>		MW-49S <sup>(W, P)</sup>		MW-49D <sup>(W)</sup>		BMW-3S		BMW-3D		BMW-203D		Rep. Limit	
	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note		
<b>Volatile Organics (ug/L)</b>																
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethene (total)	--	ND	U	1.0	ND	U	1.0	<b>3.9</b>		1.0	ND	U	1.0	ND	U	1.0
Acetone	--	<b>4.4</b>	J	10	<b>2.7</b>	J	10	ND	U	10	ND	U	10	ND	U	10
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chlorobenzene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloromethane	--	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
cis-1,2-Dichloroethene	70	ND	U	1.0	ND	U	1.0	<b>3.9</b>		1.0	ND	U	1.0	ND	U	1.0
Ethylbenzene	700	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Methylene chloride	5.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
Tetrachloroethene	5.0	ND	U	1.0	ND	U	1.0	<b>3.0</b>		1.0	ND	U	1.0	ND	U	1.0
Toluene	1,000	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
trans-1,2-Dichloroethene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Trichloroethene	5.0	ND	U	1.0	ND	U	1.0	<b>5.8</b>		1.0	ND	U	1.0	ND	U	1.0
Vinyl chloride	2.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
<b>Dissolved Gases (ug/L)</b>																
Ethane	--	ND	U	5		NA		ND	U	5.0		NA		NA		NA
Ethene	--	ND	U	5		NA		ND	U	5.0		NA		NA		NA
Methane	--	ND	U	5		NA		<b>53</b>		5.0		NA		NA		NA
<b>General Chemistry (mg/L)</b>																
Total Organic Carbon - Average	--	<b>0.30</b>	J	1.0		NA		<b>2.9</b>		1.0		NA		NA		NA

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**FINAL ANALYTICAL RESULTS**  
**APRIL 2017**  
**HARCROS CHEMICALS INC., KANSAS CITY, KS**

MCLs (ug/L)	PM-01 <sup>(P)</sup>		IW-04 <sup>(P)</sup>		IW-204 <sup>(P)</sup>		IW-08 <sup>(P)</sup>		TB-01 (042517)		TB-01 (042817) <sup>(SI)</sup>		
	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	Result	Note	Rep. Limit	
<b>Volatile Organics (ug/L)</b>													
1,1,1-Trichloroethane	200	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethane	--	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,1-Dichloroethene	7.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethane	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
1,2-Dichloroethene (total)	--	11		1.0	0.46	J	1.0	0.58	J	1.0	0.46	J	1.0
Acetone	--	ND	U	10	ND	U	10	5.8	J	10	5.1	J	10
Benzene	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Carbon tetrachloride	5.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chlorobenzene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloroform	80	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Chloromethane	--	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
cis-1,2-Dichloroethene	70	11		1.0	0.46	J	1.0	0.58	J	1.0	0.46	J	1.0
Ethylbenzene	700	ND	U	1.0	0.18	J	1.0	ND	U	1.0	ND	U	1.0
Methylene chloride	5.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	5.2		2.0
Tetrachloroethene	5.0	0.45	J	1.0	9.7		1.0	6.8		1.0	0.75	J	1.0
Toluene	1,000	ND	U	1.0	0.49	J	1.0	ND	U	1.0	0.37	J	1.0
trans-1,2-Dichloroethene	100	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0
Trichloroethene	5.0	4.6		1.0	0.68	J	1.0	0.91	J	1.0	0.62	J	1.0
Vinyl chloride	2.0	ND	U	1.0	0.31	J	1.0	0.30	J	1.0	0.53	J	1.0
Xylenes (total)	10,000	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0
<b>Dissolved Gases (ug/L)</b>													
Ethane	--	NA		ND	U	5.0	ND	U	5.0	ND	U	15	NA
Ethene	--	NA		ND	U	5.0	ND	U	5.0	ND	U	15	NA
Methane	--	NA		8,700		5.0	7,300		5.0	18,000		15	NA
<b>General Chemistry (mg/L)</b>													
Total Organic Carbon - Average	--	NA		95		2.6	97	B	2.0	85		2.2	NA
													NA

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**Water Levels April 2017**  
**Harcros Chemicals Inc.**  
**Kansas City, Kansas**

Well Number	Top of Pipe Elevation	Depth to Water 4/24/2017	Elevation of Water 4/24/2017	Total Depth (ft bgs)	Screen Interval (ft bgs)
MW-1S	765.22	40.46	724.76	51.96	28.56 - 48.56
MW-2	766.34	41.96	724.38	57.11	23.97 - 53.97
MW-2D	766.18	41.57	724.61	79.75	66.47 - 76.47
MW-3	765.45	40.98	724.47	61.2	26.95 - 57.95
MW-5	767.33	NS	--	53.86	34.15 - 54.15
MW-5D	769.54	45.19	724.35	86.06	72.59 - 82.59
MW-6	767.61	43.16	724.45	52.4	30.10 - 50.10
MW-7	768.18	43.92	724.26	51.8	30.02 - 50.02
MW-9S	766.33	42.36	723.97	55.29	31.71 - 51.71
MW-9D	763.65	39.69	723.96	76.80	72.50 - 76.50
MW-10	764.08	40.28	723.80	88.00	76.77 - 86.77
MW-11B	765.93	41.25	724.68	54.20	22.49 - 52.49
MW-11D	765.78	41.27	724.51	78.04	65.58 - 75.58
MW-12	765.91	41.42	724.49	51.64	18.17 - 48.67
MW-14	764.17	39.43	724.74	65.99	18.62 - 63.62
MW-17SA	761.86	36.64	725.22	49.55	29.61 - 49.61
MW-17D	761.73	36.55	725.18	69.10	58.84 - 68.54
MW-18S	765.02	40.50	724.52	52.88	32.23 - 52.23
MW-19S	769.01	44.90	724.11	55.56	32.54 - 52.54
MW-19D	769.54	45.41	724.13	86.21	72.81 - 82.81
MW-20S	766.24	42.28	723.96	52.6	29.19 - 49.09
MW-20D	766.11	42.17	723.94	83.44	69.96 - 79.96
MW-21S	767.60	43.69	723.91	55.39	31.65 - 51.75
MW-22S	764.52	39.98	724.54	52.54	32.20 - 51.80
MW-22D	764.64	40.06	724.58	70.07	59.52 - 69.52
MW-23S	767.10	42.60	724.50	53.9	31.89 - 51.89
MW-24S	767.29	NS	--	54.0	31.35 - 51.35
MW-25S	765.73	41.21	724.52	50.0	30.17 - 49.87
MW-25D	765.55	41.19	724.36	78.2	67.99 - 78.09
MW-26S	764.93	NS	--	53.6	31.41 - 51.41
MW-27S	765.82	41.74	724.08	50.3	30.51 - 50.31
MW-27D	765.85	41.57	724.28	81.2	70.04 - 80.14
MW-28S	767.77	43.71	724.06	53.8	31.70 - 51.70
MW-29S	768.94	44.76	724.18	53.5	31.04 - 51.04
MW-30S	766.10	42.28	723.82	50.7	30.98 - 50.98
MW-31S	748.53	22.91	725.62	40.3	19.55 - 39.55
MW-32S	750.08	24.06	726.02	39.6	19.85 - 39.85
MW-33S	745.74	19.89	725.85	45.0	24.91 - 44.91
MW-34D	769.45	NS	--	79.96	67.0 - 77.0
MW-35S	766.54	41.77	724.77	54.0	44.0 - 54.0
MW-36S	762.18	38.42	723.76	52.8	42.7 - 52.7
MW-36D	762.13	38.41	723.72	82.5	72.4 - 82.4
MW-37S	762.54	38.77	723.77	52.3	48.0 - 52.0
MW-37D	762.81	38.94	723.87	85.3	81.0 - 85.0
MW-38S	763.83	40.07	723.76	45.3	41.0 - 45.0
MW-39S	764.08	40.04	724.04	44.6	40.0 - 44.0
MW-40D	765.79	41.93	723.86	69.0	64.7 - 68.7
MW-41D	765.44	41.34	724.10	70.4	66.0 - 70.0

**Water Levels April 2017**  
**Harcros Chemicals Inc.**  
**Kansas City, Kansas**

Well Number	Top of Pipe Elevation	Depth to Water 4/24/2017	Elevation of Water 4/24/2017	Total Depth (ft bgs)	Screen Interval (ft bgs)
MW-42S	764.85	40.51	724.34	50.0	43.0 - 47.0
MW-42D	764.85	40.46	724.39	70.3	66.0 - 70.0
MW-43D	744.47	20.14	724.33	48.0	43.2 - 47.2
MW-44D	751.24	26.08	725.16	46.3	42.0 - 46.0
MW-45D	751.74	25.86	725.88	54.3	50.0 - 54.0
MW-46S	762.18	38.20	723.98	52.9	42.8 - 52.8
MW-46D	762.30	38.38	723.92	83.6	73.4 - 83.4
MW-47S	767.93	43.99	723.94	58.0	48.0 - 58.0
MW-47D	767.84	43.9	723.94	84.0	74.0 - 84.0
MW-48S	767.72	43.76	723.96	58.0	48.0 - 58.0
MW-48D	767.82	43.86	723.96	85.5	75.5 - 85.5
MW-49S	763.48	39.64	723.84	58.0	48.0 - 58.0
MW-49D	763.56	39.68	723.88	76.0	66.0 - 76.0
TMW-1	765.81	Abandoned	--	--	--
TMW-2	763.76	39.16	724.60		
TMW-4	762.47	Dry	--		
RGW-1S	NS	NS	--	50.1	29.93 - 49.93
RGW-1D	NS	NS	--	80.1	70.08 - 80.08
P-1	769.96	NS	--	53.0	46.43 - 49.93
P-2	766.49	42.15	724.34	53.5	46.73 - 50.23
P-4A	763.69	NS	--	76.71	67.36 - 77.16
P-5	764.82	40.46	724.36	79.39	69.85 - 79.75
P-6	767.15	NS	--	63.86	54.27 - 64.17
P-8	765.58	41.00	724.58	80.38	74.71 - 84.61
P-9	764.58	40.50	724.08	80.85	70.87 - 81.37
P-10	761.80	37.37	724.43	43.80	38.50-43.50
P-11	761.84	37.38	724.46	65.20	59.90-64.90
P-12	766.10	41.96	724.14	71.80	66.50-71.50
P-13	765.68	41.61	724.07	71.30	66.0-71.0
BMW-1S	765.43	41.66	723.77		
BMW-1D	765.13	41.36	723.77		
BMW-2S	764.90	41.03	723.87	49.19	
BMW-2D	765.57	41.71	723.86		
BMW-3S	763.40	39.74	723.66	50.04	
BMW-3D	763.67	39.95	723.72	86.06	
DR-01	763.59	39.67	723.92	55.0	40.0 - 55.0
DR-02	763.54	39.73	723.81	54.0	40.0 - 55.0
PM-01	763.54	36.66	726.88	55.0	40.0 - 55.0
PM-02	763.45	39.55	723.90	55.0	40.0 - 55.0
PM-03	763.56	39.45	724.11	55.0	40.0 - 55.0
IW-01	763.45	39.84	723.61	55.0	40.0 - 55.0

Kansas River Elev.

EW-1	35.27	64.0	52.7 - 62.9
EW-2	40.39	71.50	59.9 - 69.9

NS = Not Surveyed, inaccessible

MW-24S was inaccessible due to construction of a cooling tower, MW-26S was inaccessible due to loading of a train car. MW-34D could not be sampled as the above-ground portion of the riser pipe is at an angle. EW-1 and EW-2 were not running at the time the water levels were recorded. EW-2 was down due to maintenance.

**Total Organic Carbon Sample Results**  
**Southern Plume ERD System**  
**Harcos Chemicals Inc., Kansas City, KS**

Sample Group: Sample Date: Analyte (mg/L):	Baseline TOC	9/24/2012 TOC	10/29/2012 TOC	11/27/2013 TOC	12/26/2013 TOC	1/22/2013 TOC	3/18/2013 TOC	4/19/2013 TOC	5/21/2013 TOC	7/23/2013 TOC	8/20/2013 TOC
<b>Sample Location</b>											
IW-04	2.2	1400	470	290	110	1900	3400	2400	1700	2400	
IW-08	2.3	1500	480	250	100	1500	1500	2300	1600	1700	
MW-47S	2.4	100	64	40	11	160	38	29	300	66	
MW-48S	2.4	300	36	11	4.6	75	5.4	8.8	250	16	
MW-49S	1.5	--	6.7	2.6	6.3	5.9	3	3.7	6.2	2.0	

Sample Group: Sample Date: Analyte (mg/L):	9/30/2013 TOC	10/22/2013 TOC	11/18/2013 TOC	12/26/2013 TOC	3/14/2014 TOC	4/17/2014 TOC	5/29/2014 TOC	6/23/2014 TOC	7/24/2014 TOC	8/29/2014 TOC
<b>Sample Location</b>										
IW-04	2000	2100	1100	680	690	2200	2200	1200	1400	830
IW-08	930	1200	990	630	450	1600	630	400	1200	290
MW-47S	47	520	110	71	970	320	63	81	150	85
MW-48S	31	200	22	39	300	25	14	28	88	48
MW-49S	6.7	1.9	1.9	77	2.8	3.1	2.8	1.6	2.4	2.2

Sample Group: Sample Date: Analyte (mg/L):	9/29/2014 TOC	10/14/2014 TOC	11/18/2014 TOC	12/23/2014 TOC	1/28/2015 TOC	2/25/2015 TOC	3/26/2015 TOC	4/30/2015 TOC	5/27/2015 TOC	6/23/2015 TOC
<b>Sample Location</b>										
IW-04	590	--	390	250	1300	1700	560	390	250	340
IW-08	340	--	230	430	1100	1400	730	240	250	370
MW-47S	68	64	48	74	690	62	26	19	23	21
MW-48S	14	11	13	69	120	7.5	7.3	6.1	3.5	11
MW-49S	4.3	1.4	5.9	6.5	3.2	1.7	3.5	2.5	3.7	8.6

Sample Group: Sample Date: Analyte (mg/L):	7/7/2015 TOC	8/6/2015 TOC	9/15/2015 TOC	10/27/2015 TOC	11/19/2015 TOC	12/22/2015 TOC	1/14/2016 TOC	2/11/2016 TOC	3/16/2016 TOC	4/27/2016 TOC
<b>Sample Location</b>										
IW-04	290	280	740	260	240	300	240	220	240	210
IW-08	270	260	660	160	140	150	130	81	80	110
MW-47S	23	22	24	11	17	9	7.3	20	29	4.8
MW-48S	11	3.5	5.1	6.7	2.1	4.8	3.8	5	5.9	2.6
MW-49S	1.8	4.9	3.1	3	3.9	8.6	3.7	5.3	3.6	4.3

**Notes:**

B = Blank contamination

TOC = Total Organic Carbon

mg/L = milligrams per liter

-- = Not Sampled

Injection Event Dates: September 26-October 2, 2012; February 12-19, 2013; June 20-27, 2013; October 1-7, 2013; March 5-12, 2014; June 24-July 2, 2014; January 12-16, 2015

**Total Organic Carbon Sample Results  
Southern Plume ERD System  
Harcros Chemicals Inc., Kansas City, KS**

Sample Group: Sample Date: Analyte (mg/L):	5/16/2016 TOC	6/24/2016 TOC	7/27/2016 TOC	8/16/2016 TOC	9/29/2016 TOC	10/27/2016 TOC	11/21/2016 TOC	12/14/2016 TOC	1/10/2017 TOC	2/13/2017 TOC
<b>Sample Location</b>										
IW-04	290	380	210	150	140	110	99	100	150	130
IW-08	130	40	21	15	44	21	22	49	51	68
MW-47S	37	8.4	8.3	32	11	5.8	12	12	6.5	20
MW-48S	140	3.8	3.9	11	4.6	6.3	2.8	4.3	4.5	9.6
MW-49S	110	5.3	2.1	4.7	4.6	2.5	6	3.1	3.2	2.9

Sample Group: Sample Date: Analyte (mg/L):	3/13/2017 TOC	4/27/2017 TOC	5/11/2017 TOC	6/21/2017 TOC	7/12/2017 TOC	8/17/2017 TOC	9/8/2017 TOC
<b>Sample Location</b>							
IW-04	150 B	95	150	84 B	59	32	75 B
IW-08	70 B	85	78	19 B	19	7.4	5.8 B
MW-47S	32 B	4.1	6.7	4.1 B	6.8	8.2	9.4 B
MW-48S	6.1 B	3.9	2.7	3.2 B	3.0	2.6	2.4 B
MW-49S	4.3 B	2.9	7.0	6.6 B	2.6	6.2	2.7 B

**Notes:**

B = Blank contamination

TOC = Total Organic Carbon

mg/L = milligrams per liter

-- = Not Sampled

Injection Event Dates: September 26-October 2, 2012; February 12-19, 2013; June 20-27, 2013; October 1-7, 2013; March 5-12, 2014; June 24-July 2, 2014; January 12-16, 2015

**FINAL ANALYTICAL RESULTS**  
**VOLATILE ORGANIC COMPOUNDS**  
**JULY 2017**  
**HARCROS, KANSAS CITY, KS**

	MW-20S <sup>(P)</sup>		MW-47S <sup>(W,P)</sup>		MW-48S <sup>(W,P)</sup>		MW-49S <sup>(W,P)</sup>		PM-01 <sup>(P)</sup>		PM-01(20170713)D <sup>(P)</sup>		PM-01(20170713)R <sup>(P)</sup>		IW-04 <sup>(P)</sup>		IW-08 <sup>(P)</sup>		TRIPBLANK			
Result	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	Rep. Limit	Note	
<b>Volatile Organics (ug/L)</b>																						
1,1,1-Trichloroethane	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
1,1-Dichloroethane	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
1,1-Dichloroethene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
1,2-Dichloroethane	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
1,2-Dichloroethene (total)	6.0		1.0	0.46	J	1.0	ND	U	1.0	6.3		1.0	17		1.0	16		1.0	0.51	J	1.0	0.97
Acetone	4.0	J	10	5.3	J	10	2.6	J	10	6.2	J	10	7.1	J	10	6.1	J	10	ND	U	10	7.9
Benzene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
Carbon tetrachloride	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
Chlorobenzene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
Chloroform	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	1.7		1.0	ND	U	1.0	
Chloromethane	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	
cis-1,2-Dichloroethene	6.0		1.0	0.46	J	1.0	ND	U	1.0	6.3		1.0	17		1.0	16		1.0	0.51	J	1.0	0.97
Ethylbenzene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	
Methylene chloride	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	
Tetrachloroethene	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.59	J	1.0	0.41	J	1.0	0.31	J	1.0	ND	U	1.0	
Toluene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.26	J	1.0	ND
trans-1,2-Dichloroethene	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.22	J	1.0	0.18	J	1.0	ND	U	1.0	
Trichloroethene	0.35	J	1.0	ND	U	1.0	ND	U	1.0	4.9		1.0	2.5		1.0	2.2		1.0	ND	U	1.0	
Vinyl chloride	ND	U	1.0	0.79	J	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	ND	U	1.0	0.75	J	1.0	0.85
Xylenes (total)	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	ND	U	2.0	
<b>Dissolved Gases (ug/L)</b>																						
Ethane		NA		ND	U	5.0	ND	U	5.0	ND	U	5.0		NA		NA		ND	U	5.0	ND	
Ethene		NA		ND	U	5.0	ND	U	5.0	ND	U	5.0		NA		NA		ND	U	5.0	ND	
Methane		NA	12,000		5.0	810		5.0	290		5.0		NA		NA		NA	13,000		5.0	13,000	

**Notes**

(W) = Warehouse performance monitoring wells

(P) = Southern Plume ERD Performance monitoring wells

Duplicate: PM-01(20170713)D = PM-01

Trip Blanks: TRIPBLANK

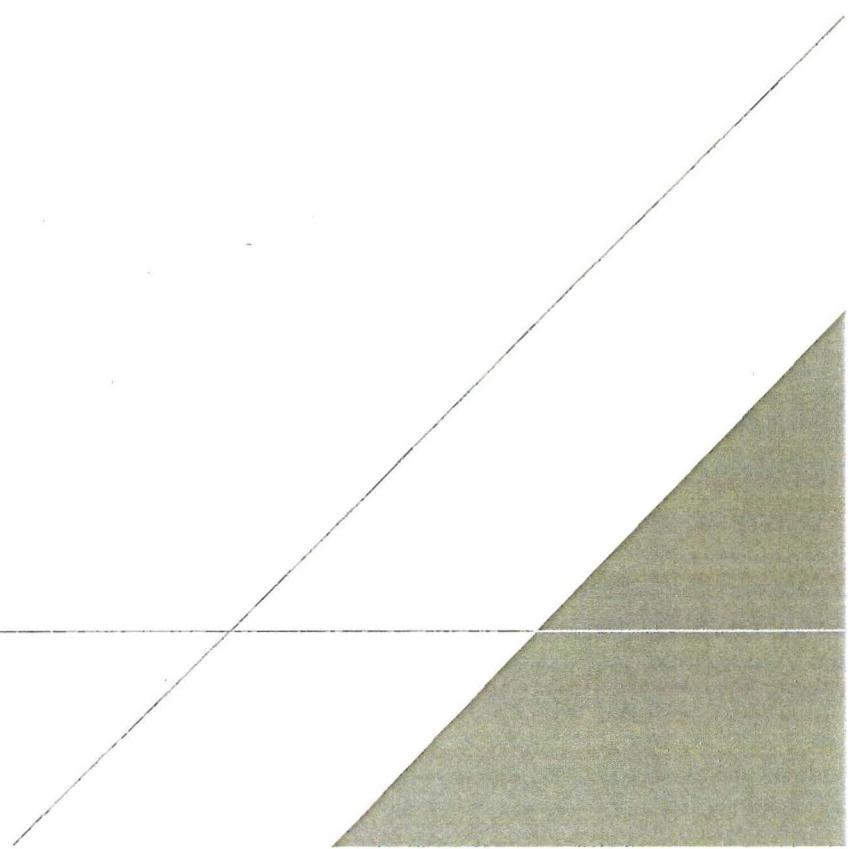
Rinsate: PM-01(20170713)R

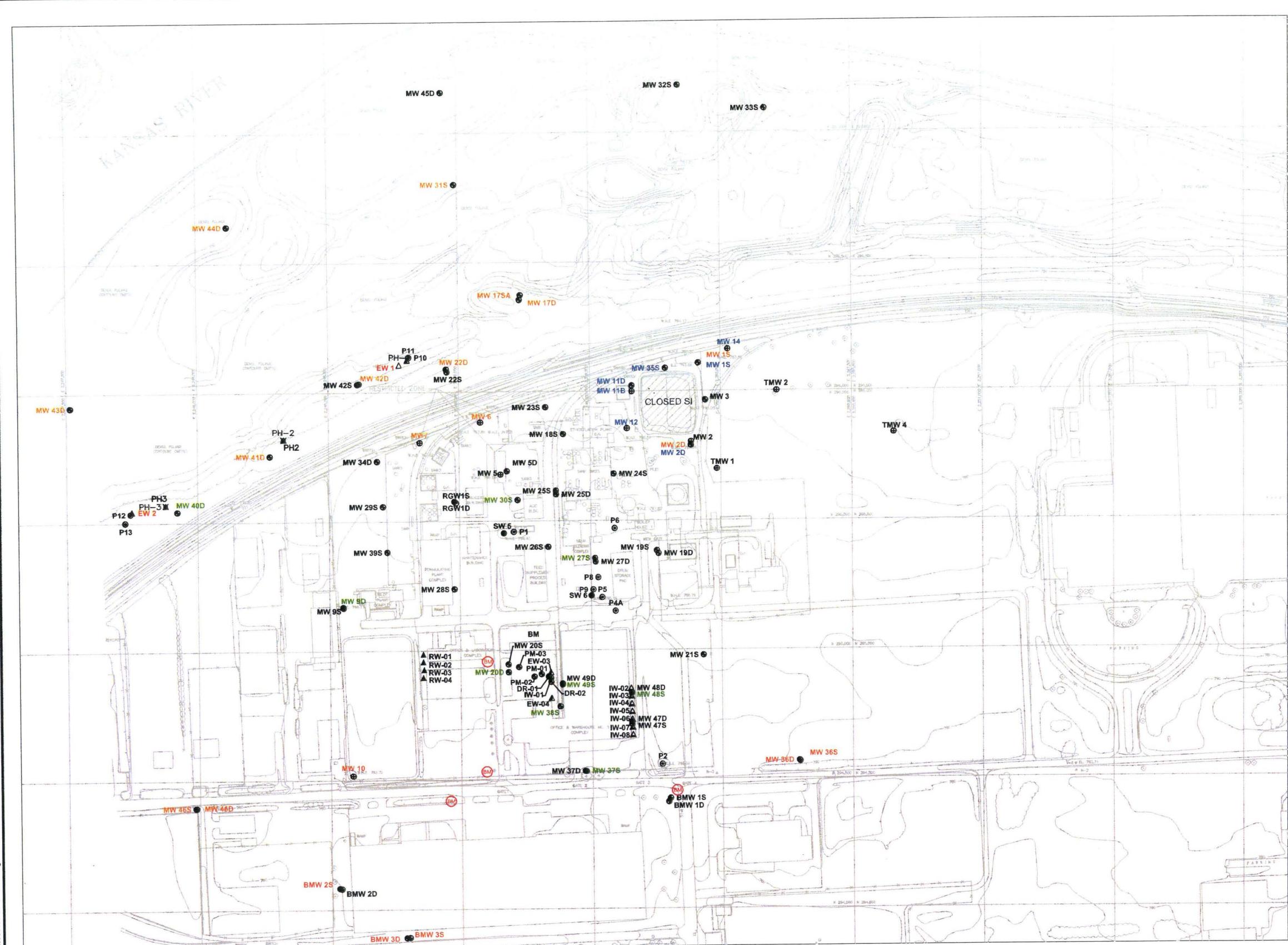
NA = Not Analyzed

U = Not Detected at or above RL

J = Estimated result less than RL

## FIGURES





**LEGEND**

RGWIS	●	TEMPORARY MONITORING WELL
P8	○	PIEZOMETER
MW 26S	●	MONITORING WELL
MW 5	⊕	MONITORING WELL(PRIOR TO RFI)
SW 6	●	SUPPLY WELL
EW1	▲	EXTRACTION WELL
IW1	▲	INJECTION WELL
RW1	▲	REINJECTION WELL
PH2	☒	PILOT HOLE BORING

## **GROUNDWATER SAMPLING PROGRAMS**

**MW 31 S** STABILIZATION SYSTEM (SEMI-ANNUAL)  
**MW 27 S** FACILITY WIDE (ANNUAL)  
**MW 12** CLOSED SURFACE  
IMPOUNDMENT-CURRENT

**NOTES:**

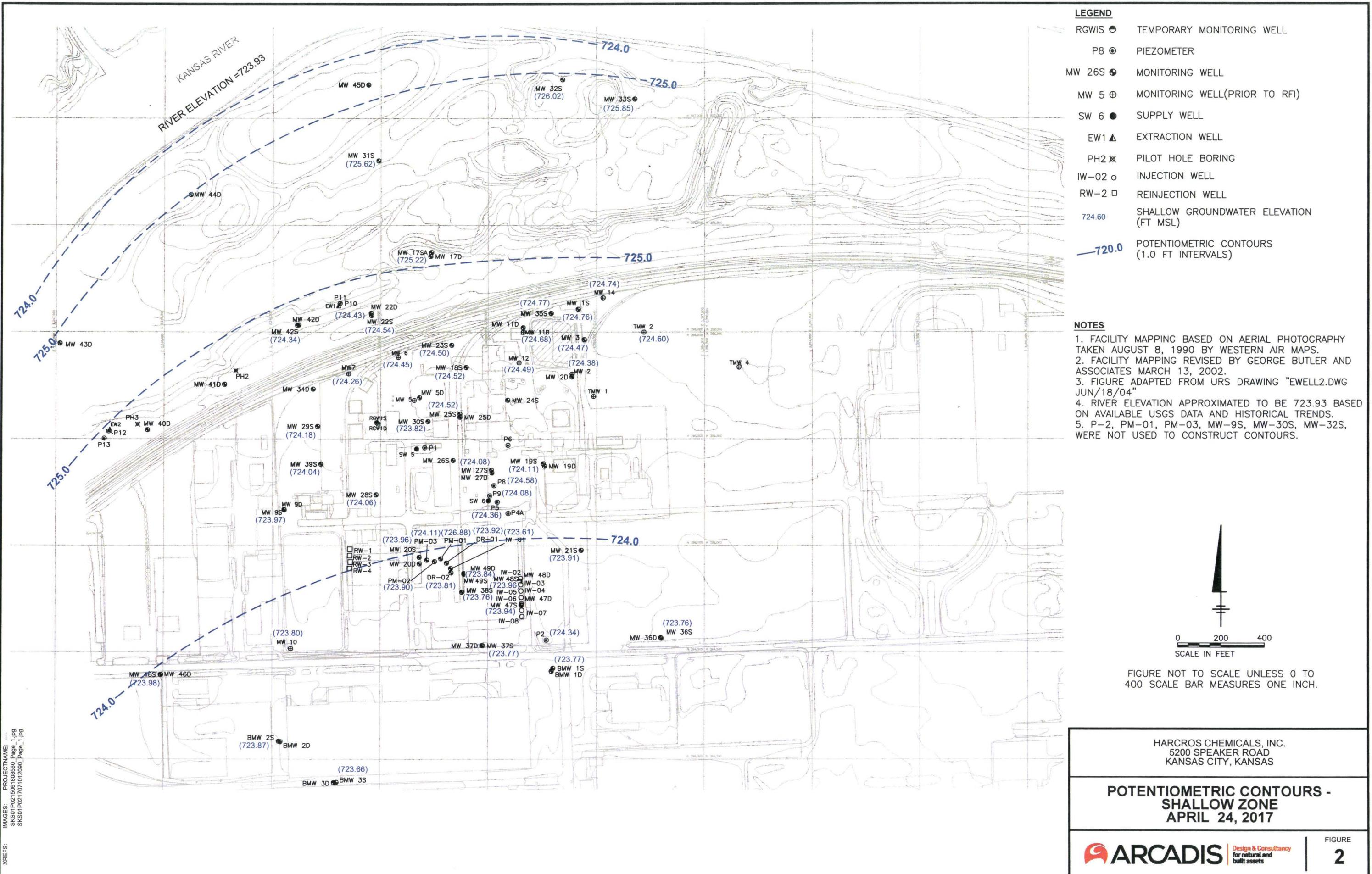
1. FACILITY MAPPING BASED ON AERIAL PHOTOGRAPHY TAKEN AUGUST 8, 1990 BY WESTERN AIR MAPS.
  2. FACILITY MAPPING REVISED BY GEORGE BUTLER AND ASSOCIATES MARCH 13, 2002



FIGURE NOT TO SCALE UNLESS 0 TO 400  
SCALE BAR MEASURES ONE INCH

HARCROS CHEMICALS, INC.  
5200 SPEAKER ROAD  
KANSAS CITY, KANSAS

## SITE PLAN

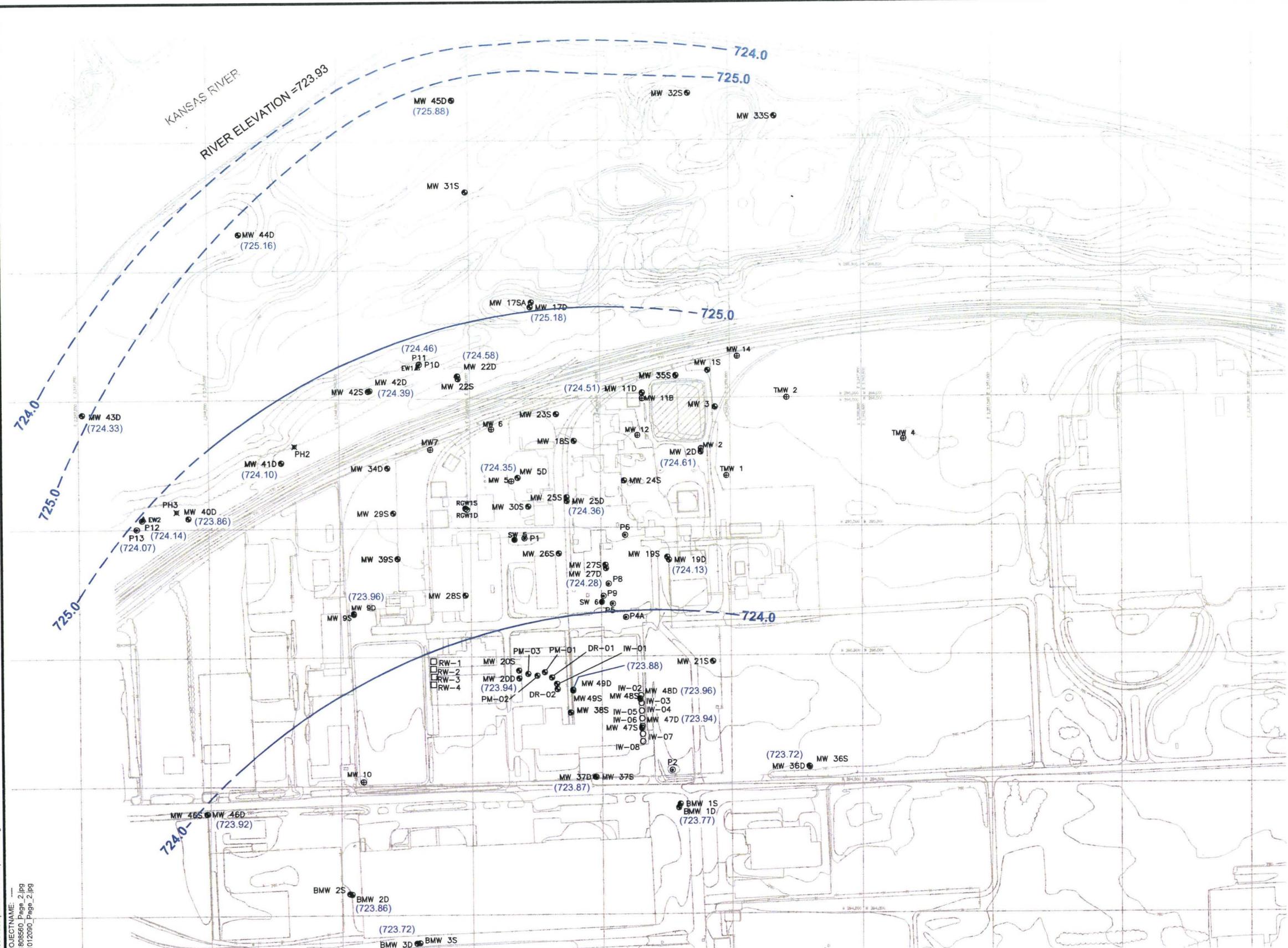


CITY: Milwaukee, WI DIV/GROUP: ENV DB: C: McKeough LD:(Opt) PIC:(Opt) PM:(Reqd) LYR:(Opt) ON+OFF=REF\*  
GIVEN=CADlansing-MIACTk00145&Print=17 Pot MARSHALL.dwg LAYOUT: 3-7 SAVED: 7/10/2017 3:16 PM ACADVER: 19.1(S) LMS TECH PAGESETUP: PDF-B PLOTSTY:ETARL: BLACKGRAY CTR PLOTTER: 1060/2017 50 PM BY: AKENS DAVID

CITY: Milwaukee, WI DIV/GROUP: ENV DB: C. McKeough L/D:(Opt) PIC:(Opt) PM:(Reqd) TM: B. Mason LYR:(Opt)ON=\*,OFF=REF  
G:ENV@CDLansing-MHAC\TMCD01458\April 2017 Pot MAPSHALLOW.dwg LAYOUT: 3-7 SAVED: 7/10/2017 3:16 PM ACADVER: 19.1S (LMS)

PROJECT NAME: SECRET

XREFS: IMAGES: SKETCHES:



LEGEND	
RGWIS ●	TEMPORARY MONITORING WELL
P8 ◉	PIEZOMETER
MW 26S ◉	MONITORING WELL
MW 5 ◉	MONITORING WELL(PRIOR TO RFI)
SW 6 ●	SUPPLY WELL
EW1 ▲	EXTRACTION WELL
PH2 ✕	PILOT HOLE BORING
IW-02 ○	INJECTION WELL
RW-2 □	REINJECTION WELL
(724.61)	DEEP GROUNDWATER ELEVATION (FT MSL)
— 720.0	POTENTIOMETRIC CONTOURS (1.0 FT INTERVALS)

#### NOTES

1. FACILITY MAPPING BASED ON AERIAL PHOTOGRAPHY TAKEN AUGUST 8, 1990 BY WESTERN AIR MAPS.
2. FACILITY MAPPING REVISED BY GEORGE BUTLER AND ASSOCIATES MARCH 13, 2002.
3. FIGURE ADAPTED FROM URS DRAWING "EWELL2.DWG JUN/18/04"
4. RIVER ELEVATION APPROXIMATED TO BE 723.93 BASED ON AVAILABLE USGS DATA AND HISTORICAL TRENDS.
5. MW-9D AND MW-40D WERE NOT USED TO CONSTRUCT CONTOURS.

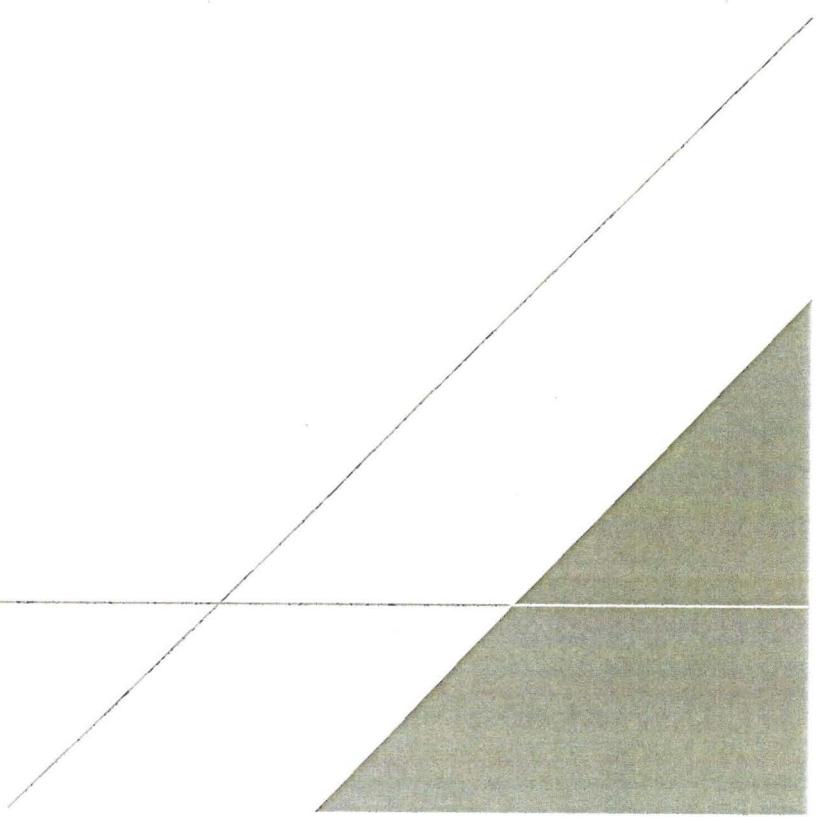


FIGURE NOT TO SCALE UNLESS 0 TO 400 SCALE BAR MEASURES ONE INCH.

HARCROS CHEMICALS, INC.  
5200 SPEAKER ROAD  
KANSAS CITY, KANSAS

**POTENTIOMETRIC CONTOURS - DEEP ZONE**  
**APRIL 24, 2017**

## Well Logs



PROJECT NO. C2001007

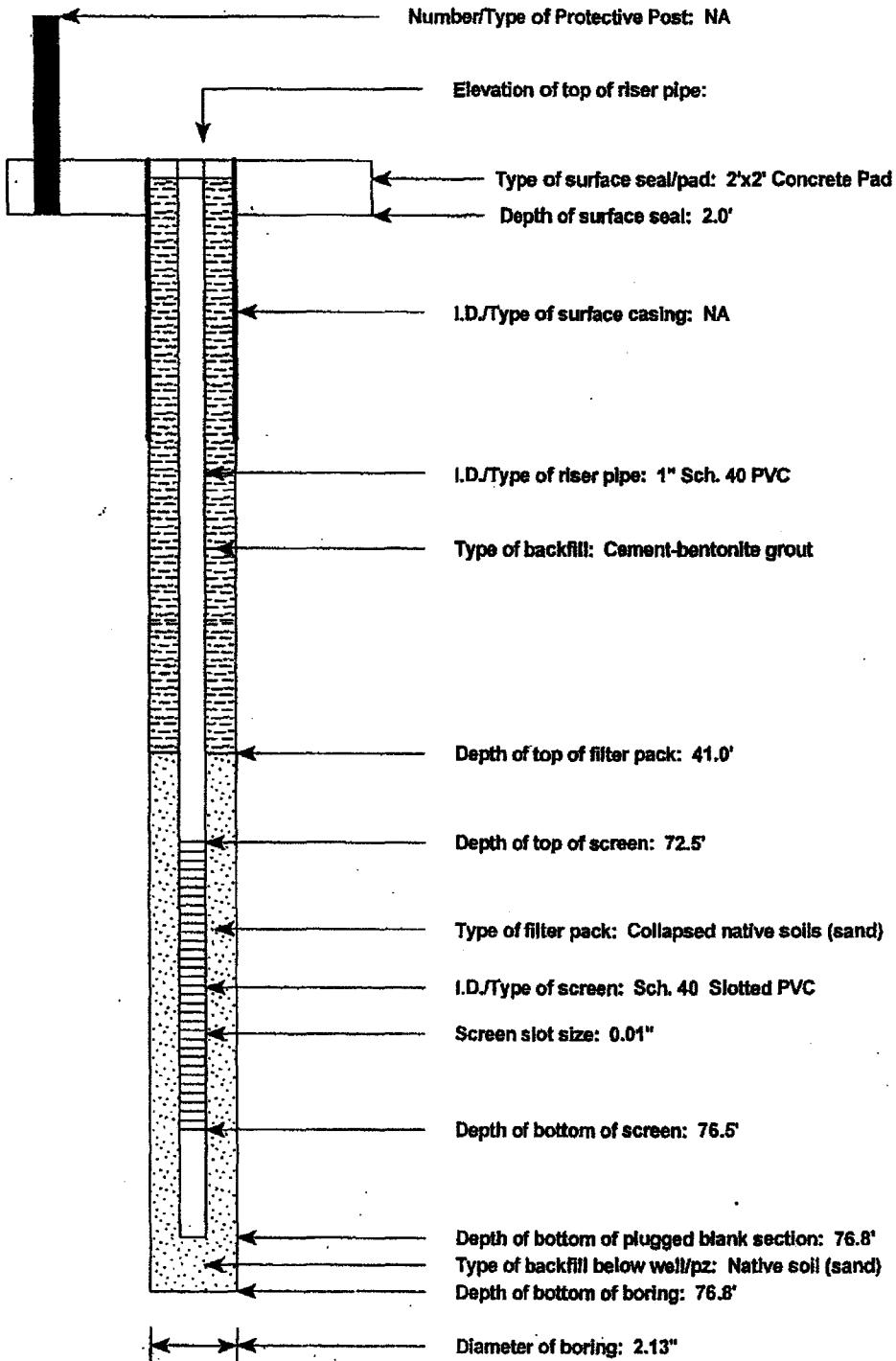
FILE NO.

10.1

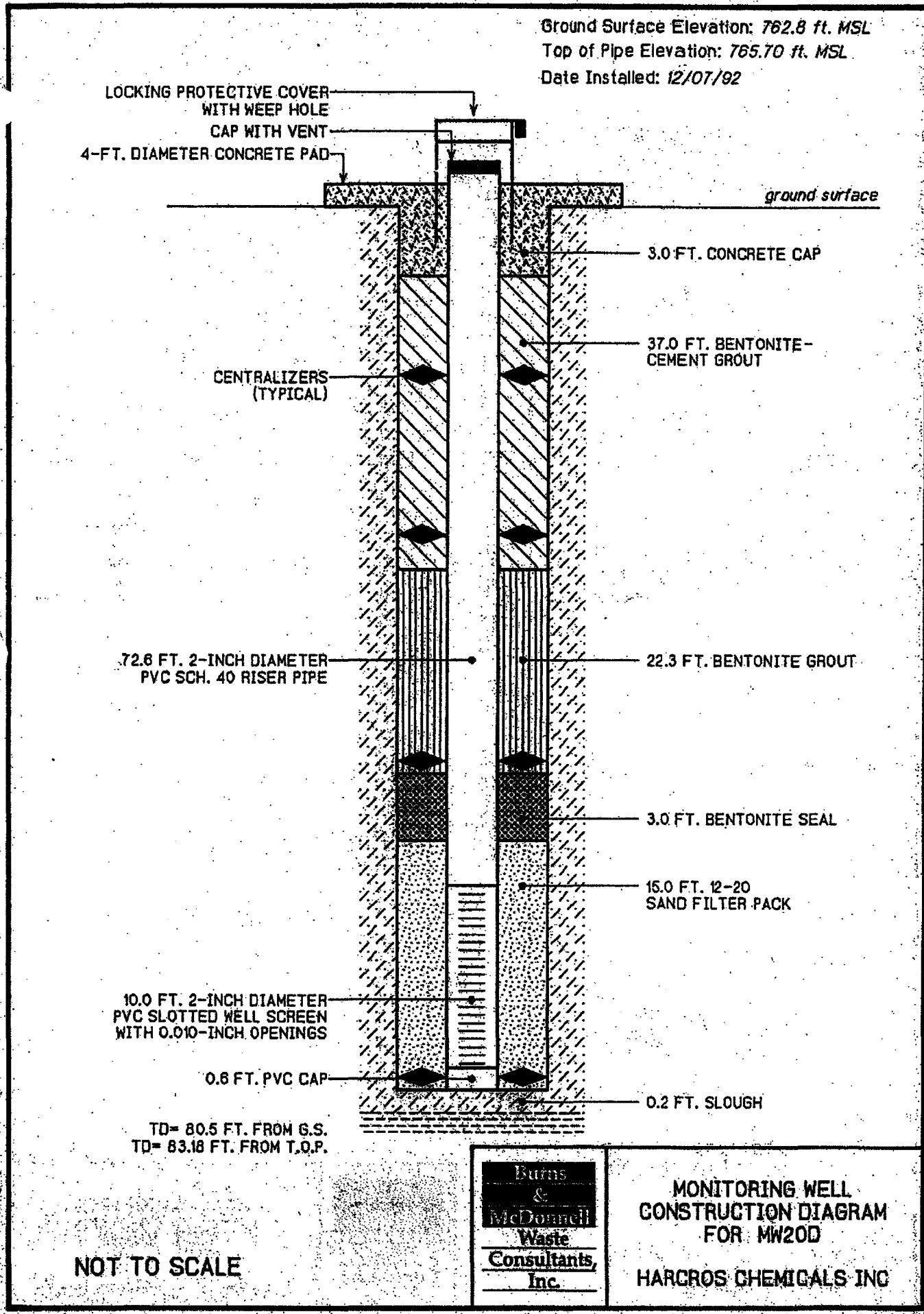
## GROUNDWATER MONITORING WELL/PIEZOMETER REPORT

PROJECT NAME: HARCROS CHEMICALS (THAN) MW/PZ NO: MW- 9D  
PROJECT LOCATION: 5200 SPEAKER ROAD, KANSAS CITY, KANSAS PROJECT NO: 49C2001007.00  
INSTALLED BY: IPS DATE: 4-9-02  
INSPECTED BY: J. Fisher GRND ELEV:  
METHOD OF INSTALLATION: Geoprobe 6610 DT NORTH:  
OBSERVATIONS: Allowed native soils (sand) to collapse around well screen EAST:

For detailed geologic descriptions see boring log:



Note: Depths are in feet below grade.

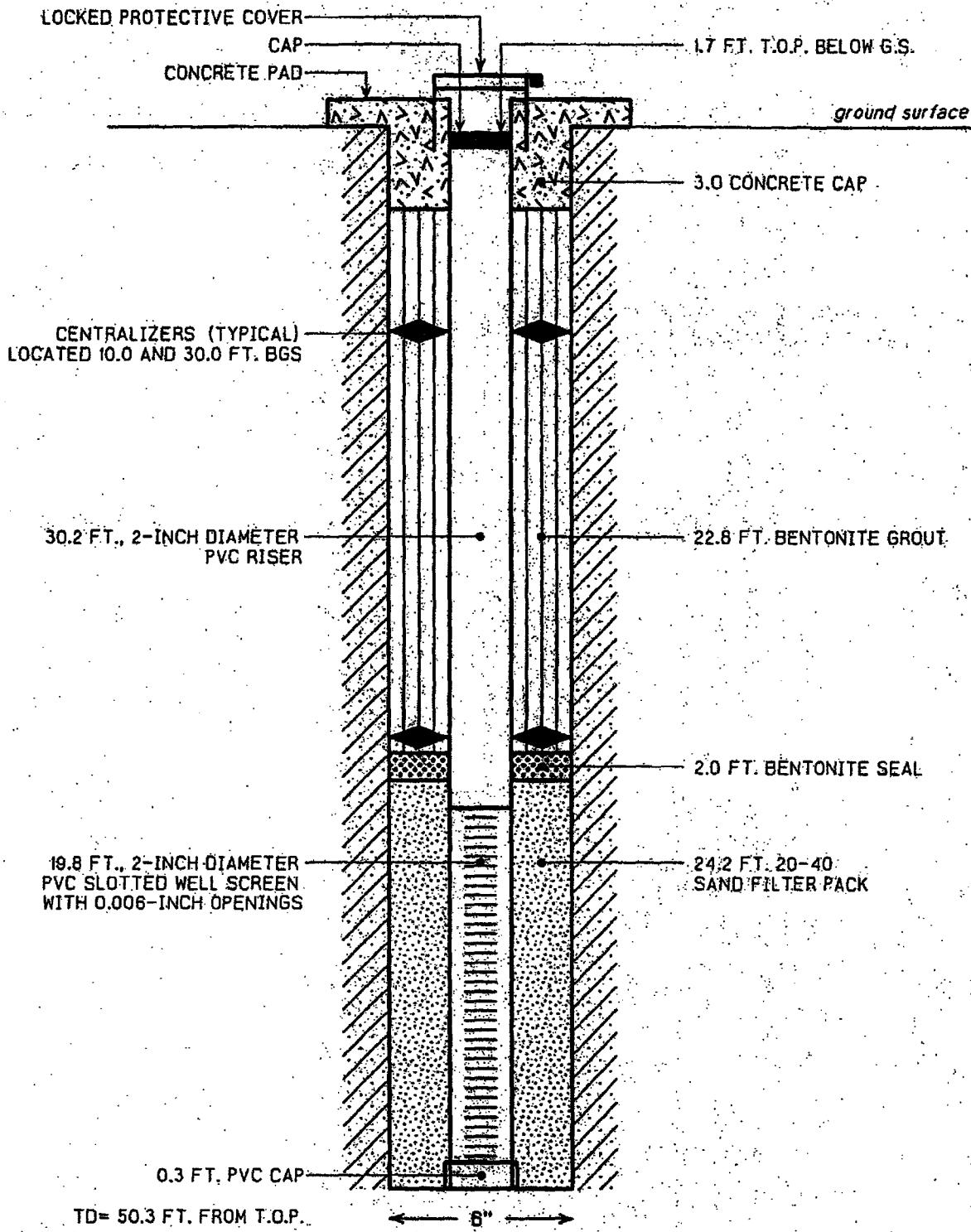


Burns  
 &  
 McDonnell  
 Waste  
 Consultants,  
 Inc.

MONITORING WELL  
 CONSTRUCTION DIAGRAM  
 FOR MW20D  
 HARCROS CHEMICALS INC

Project Name: HARCOS CHEMICAL  
Project Number: 87-021-4-009-02

Ground Surface Elevation: 765.81 ft. MSL  
Top of Casing Elevation: 761.13 ft. MSL  
Date Installed: 06/24/94



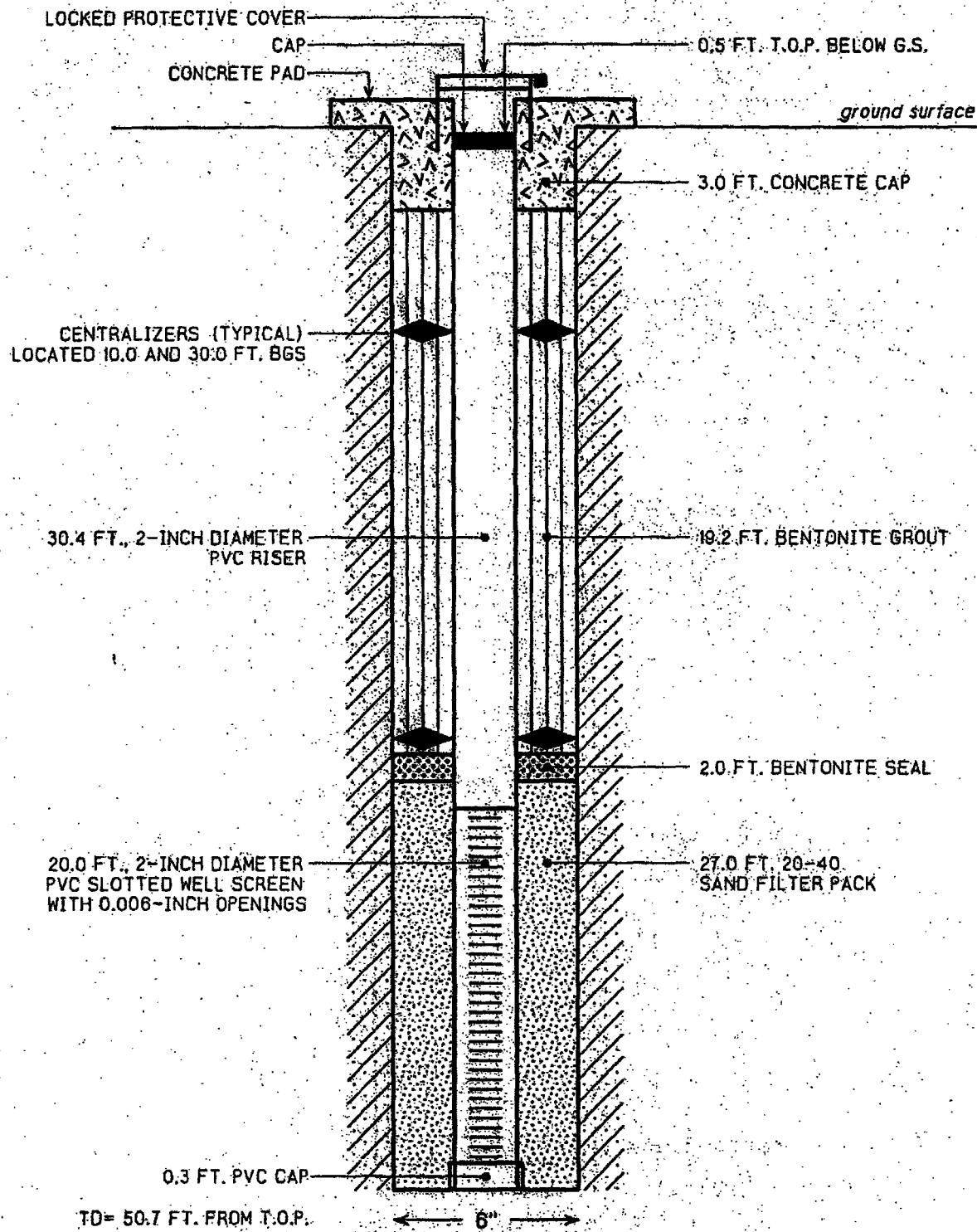
NOT TO SCALE

BUTTS  
&  
McDonnell  
Waste  
Consultants,  
Inc.

MONITORING WELL  
CONSTRUCTION DIAGRAM  
FOR MW27S

Project Name: HARROWS CHEMICAL  
Project Number: 87-021-4-009-02

Ground Surface Elevation: 769.28 ft. MSL  
Top of Casing Elevation: 765.71 ft. MSL  
Date Installed: 07/12/94



NOT TO SCALE

Dunn  
&  
McDonnell  
Waste  
Consultants  
INC.

MONITORING WELL  
CONSTRUCTION DIAGRAM  
FOR MW303

# BORING LOG

PROJECT NAME Harcros Chemicals, Inc  
 PROJECT LOCATION 5200 Speaker Rd KCK  
 LOGGED BY J. Fisher (URS) DRILLED BY D. Lovett - IPS  
 SURFACE ELEVATION  ELEVATION DATUM   
 GROUND WATER   
 OBSERVATIONS

UW-9.D

SHEET 1 of 2  
 PROJECT NO. 49C200100700  
 TASK NO. 03223  
 DATE 4-10-02  
 RIG Geoprobe 6610 DT

DEPTH, ft.	SAMPLE					DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	ROD LENGTH	REC/ROD	RESISTANCE PP, KSF				
0						Soil			Probe advanced w/ 2 1/8"OD rods
10									Used 1" Sch 40 PVC casing w/
20									sch 40 PVC 0.010 slot screen
30									2' bgs Top of cement bentonite grout
40									
50									Bottom of 41' bgs grout Top of sands

FIELDLOG

URS

49C200100700 401.1

## **BORING LOG**

PROJECT NAME Harcros Chemicals, Inc.  
PROJECT LOCATION 5200 Speaker Rd KCK  
LOGGED BY J. Fisher (URS) DRILLED BY D. Loretz - IPS  
SURFACE ELEVATION \_\_\_\_\_ ELEVATION DATUM \_\_\_\_\_  
GROUND WATER \_\_\_\_\_  
OBSERVATIONS \_\_\_\_\_

MW - 9D

SHEET 2 of 2  
PROJECT NO. 49C200100700  
TASK NO. 03223  
DATE 4-10-02  
RIG Geoprobe 6610 DT

**URS**

# Drilling Log

Project Name <b>HARCOS CHEMICAL</b>		Project Number <b>87-021-4-009</b>			Boring Number <b>MW20D</b>					
Ground Elevation 762.76 ft. MSL	Location <b>NORTH 294915.93, EAST 2249182.89</b>			Page <b>1 of 1</b>						
Air Monitoring Equipment <b>OVM 580B &amp; NEOTRONICS EXOTOX LEL/ OXYGEN</b>				Total Footage <b>81.5</b>						
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples		No. Of Core Boxes				
MUD ROTARY	6"	80'	1.5'	0		0				
Drilling Company 2AYNE- WESTERN			Driller (s) F. CHILCHETT							
Drilling Rig GARDNER DENVER 1500			Type of Sampler <b>NONE</b>							
Date 12/07/92	To 12/07/92	Field Observer (s) T. COLLINS								
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
5	SAND, silty, with minor clay lenses	SM ML					0.0	0.0		See RB20 for detailed description. Start @ 1125 on 12/07/92. Logged by cuttings.
10							0.0	0.0	LEL = 0.0	
15							0.0	0.0	LEL = 0.0	
20							0.0	0.0	LEL = 0.0	
25							0.0	0.0	LEL = 0.0	
30							0.0	0.0	LEL = 0.0	
35							0.0	0.0	LEL = 0.0	
40	SAND, fine to coarse grained, some silt, minor clay lenses	SP SW					0.0	0.0	LEL = 0.0	
45							0.0	0.0	LEL = 0.0	
50							0.0	0.0	LEL = 0.0	
55							0.0	0.0	LEL = 0.0	
60							0.0	0.0	LEL = 0.0	
65							0.0	0.0	LEL = 0.0	
70							0.0	0.0	LEL = 0.0	
75							0.0	0.0	LEL = 0.0	
80	SANDSTONE	SS					0.0	0.0	LEL = 0.0	Monitoring Well Installed 12/07/92. See Well Construction Diagram in Appendix A for details.
(TOTAL DEPTH = 80.5 FT)										

BZ-Breathing Zone BH-Bore Hole S-Sample

# Drilling Log

Project Name HARCROS CHEMICAL		Project Number 87-021-4-009-02				Boring Number <b>MW27S</b>					
Ground Elevation 765.81 ft. MSL	Location N 295354.75 E 2249515.80					Page 1 of 6					
Air Monitoring Equipment OVM 580B & MSA LEL/ OXYGEN				Total Footage 52							
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples		No. Of Core Boxes					
MUD ROTARY	5 7/8"	52'	0	12		NONE					
Drilling Company LAYNE, KC, KS				Driller(s) TOM BUTLER							
Drilling Rig GARDNER-DENVER 500				Type of Sampler SPLIT SPOON							
Date 06/23/94	To 06/24/94	Field Observer(s) MARTHA HILDEBRANDT									
Depth (feet)	Description	Class	Blow Count	Recov.	Run/Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels	
							BZ	BH	S		
1	ASPHALT										Start @ 2020 6/23/94
1	SILT, light yellowish brown (2.5YR6/3), moist, nonplastic, soft	ML									BG is background OVM reading
1					SS-1 2026						Mixed 150 lbs aquagel with 200 gallons of water.
2											0% LEL
3					SS-2 2035						
4											
5											
6	CLAY, some silt, light yellowish brown (2.5YR6/3), moist, medium plasticity, medium consistency	CL									
6					SS-3 2039						
6											
7											

BZ=Breathing Zone BH=Bore Hole S=Sample

DRAFT	RECEIVED
4	GENERAL SURVEY
H. D. DRILLING CO.	ENCL.

# Drilling Log Continuation

								Boring Number MW27S		
Project Name HARCROS CHEMICAL				Page 4 of 6						
Project Number 87-021-4-009-02				Date 06/23/94						
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
BZ	BH	S								
26	SILT, some fine sand, light brownish gray (2.5YR6/2), moist, medium consistency, nonplastic	ML	12/ 10/ 13/ 16	0.6/ 2.0	SS-7 2125	SB7 25-27	1.8	3.1	74	0% LEL
27										
28										
29										
30					SS-8 2140					BG 0.8 ppm
31			10/ 11/ 10/ 13	0.7/ 2.0		S88 30-32	0.8	0.8	84	0% LEL
32										
33										
34										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drillers  
Consultants  
Inc.  
McDonnell's  
Zinc

# Drilling Log Continuation

							Boring Number MW27S		
Project Name HARCROS CHEMICAL							Page 5 of 6		
Project Number 87-021-4-009-02							Date 06/23/94		
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)		
							BZ	BH	S
	SILT, some fine sand, light brownish gray (2.5YR6/2), moist, medium consistency, trace plasticity	ML							
35	SAND, some fine gravel, gray (N5), moist, dense, fine to coarse grained, well graded	SW	15/ 21/ 21/ 21	0.9/ 2.0	SS-9 2152	SB9 35-37	3.1	3.1	8.1
36									
37									
38									
39									
40	SAND, gray (N4), wet, very dense, medium to coarse grained, poorly graded, well rounded, mainly quartz	SP	10/ 16/ 39/ 42	1.1/ 2.0	SS-10 2210	SS10 40-42	0.0	0.0	3.2
41									
42									
43									

BZ=Breathing Zone BH=Bore Hole S=Sample

DRILLING  
Consultants  
McDonnell & Sons

# Drilling Log Continuation

							Boring Number <b>MW27S</b>
Project Name HARCROS CHEMICAL							Page 6 of 6
Project Number 87-021-4-009-02							Date 06/23/84
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)
							BZ
44	SAND, grey (N4), wet, very dense, medium to coarse grained, poorly graded, well rounded, mainly quartz	SP					
45	SAND, with fine gravel, dark gray (N4), wet, dense, coarse, well graded, well rounded, mainly quartz, ~1" clay nodules present	SW			SS-II 2231		0% LEL
46			23/ 18/ 13/ 8	0.8/ 2.0		SSII 45-47	OVM battery gone
47							
48							06/24/84 Install monitoring well, 0.3' end cap, 18.8' of 2" #6 slot PVC screen, 45' PVC riser. Centralizers at 10' and 30' BGS. Sand (20/40) to 27.8' bgs. Bentonite grout to gs
49							
50					SS-12 2248		
51			12/ 16/ 14/ 18	0.8/ 2.0		SS12 50-52	0% LEL
52	TOTAL DEPTH = 52.0 FT						

BZ=Breathing Zone BH=Bore Hole S=Sample

# Drilling Log

Project Name HARCROS CHEMICAL		Project Number 87-021-4-009-02			Boring Number <b>MW30S</b>					
Ground Elevation 766.28 ft. MSL	Location N 295581.64 E 2249221.84			Page 1 of 6						
Air Monitoring Equipment OVM 580B & MSA LEL/ OXYGEN				Total Footage 52						
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples		No. Of Core Boxes				
MUD ROTARY	5 5/8"	52'	0	11		NONE				
Drilling Company LAYNE- WESTERN				Driller(s) TOM BUTLER/SHAWN WATSON						
Drilling Rig GARDNER-DENVER 500				Type of Sampler SPLITSPON						
Date 07/11/94		To 07/12/94		Field Observer(s) MIKE MCKINLEY						
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Design.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
0	SILT, brown (7.5 YR5/3), damp, soft, trace plasticity	ML					0.0	0.0		Start @ 0928 7/11/94
1					SSI/ 0945					0% LEL
2				5/ 2/ 1/ 0	1.5/ 2.0					
3										
4										
5	SILT, brown (7.5YR5/3), moist, soft, trace plasticity				SS2/ 0820					At 5' hit water line. The water line was repaired and the borehole was moved approximately 10' west.
6				2/ 3/ 5/ 4	1.7/ 2.0			0.0	0.0	Start drilling @ 0745 7/12/94
7								0.0	0.0	0% LEL

BZ=Breathing Zone BH=Bore Hole S=Sample

Project Name  
HARCROS CHEMICAL  
Consultants  
H. D. Mulligan & Son, Inc.

# Drilling Log Continuation

							Boring Number <b>MW30S</b>
Project Name <b>HARCROS CHEMICAL</b>							Page <b>2 of 6</b>
Project Number <b>87-021-4-009-02</b>							Date <b>07/11/94</b>
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)
							BZ BH S
8	SILT, brown (7.5YR5/3), moist, soft, trace plasticity	ML					
9							
10	SILT, brown (7.5YR5/3), damp, soft, layered				SS3/ 0830		
11		5/ 6/ 11/ 9		1.6/ 2.0			0.0 0.0 21.5
12							
13							
14							
15					SS4/ 0838		
16		19/ 15/ 25/ 24		1.4/ 2.0			0.0 0.0 0.0

BZ=Breathing Zone

BH=Bore Hole

S=Sample

0-100	100-200
A	Consultant
B	ENR

# Drilling Log Continuation

							Boring Number MW30S				
Project Name HARCROS CHEMICAL							Page 3 of 6				
Project Number 87-021-4-009-02							Date 07/11/94				
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)		Remarks/ Water Levels		
							BZ	BH			
16	SILT, brown (7.5YR5/3), damp, medium density, layered, trace plasticity	ML	19/ 15/ 25/ 24	1.4/ 2.0	SS4/ 0838		0.0 0.0 0.0			0% LEL	
17										0% LEL	
18											
19											
20	SILT, light yellowish brown (7.5YR5/3), damp, medium density, trace plasticity		25/ 26/ 30/ 23	1.3/ 2.0	SS5/ 0905		0.0 0.0 3.2			0% LEL	
21											
22											
23											
24											
25											

BZ=Breathing Zone BH=Bore Hole S=Sample

On Site Meets  
Consultants  
McDermott Inc.  
Inc.

# Drilling Log Continuation

							Boring Number MW30S
Project Name HARCROS CHEMICAL							Page 4 of 6
Project Number 87-021-4-009-02							Date 07/11/94
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)
							BZ BH S
26	SILT, light olive brown (2.5YR5/4), damp to moist, medium density, trace plasticity	ML	11/ 14/ 21/ 19	1.1/ 2.0	SS6/ 0915		0.0 0.0 9.7
27							
28							
29							
30	SILT, light olive brown (2.5YR5/4), moist, soft, trace plasticity				SS7/ 0938		
31	SAND, light yellowish brown (2.5YR6/3), fine grained moist, poorly graded	SP	20/ 32/ 55/ 50	1.2/ 2.0			0.0 0.0 0.0
32							
33							
34							

BZ=Breathing Zone BH=Bore Hole S=Sample

0.000 0.000  
0.000 0.000  
0.000 0.000

# Drilling Log Continuation

							Boring Number MW30S		
Project Name HARCROS CHEMICAL							Page 5 of 6		
Project Number 87-021-4-009-02							Date 07/11/94		
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)		Remarks/ Water Levels
BZ	BH	S							
	SAND, light yellowish brown (2.5YR6/3), fine grained moist, poorly graded, very dense	SP							
35	SAND, light olive brown (2Y5/4), moist, very dense, poorly graded, fine to medium grained				SS8/ 0958				
36			14/ 26/ 34/ 34	1.1/ 2.0			0.0	0.0	5.2 0% LEL
37									
38									
39									
40	SAND, olive brown (2.5YR4/3), wet, fine to coarse grained, well graded, medium density	SW			SS9/ 1035				
41			9/ 11/ 16/ 16	0.9/ 2.0			0.0	0.0	18.1 0% LEL
42									
43	SAND, olive brown (2.5Y4/3), wet, medium grained, poorly graded, medium density	SP							

BZ=Breathing Zone BH=Bore Hole S=Sample

Consultants  
McDonnell Corp.  
Erie, PA

# Drilling Log Continuation

							Boring Number	MW30S		
							Page	6 of 6		
							Date	07/11/94		
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
44	SAND, olive brown (2.5Y4/3), wet, medium grained, poorly graded, medium density	SP								
45						SS10/ 1045				
46			10/ 12/ 20/ 21	0.8/ 2.0			0.0	0.0	5.3	
47										OX LEL
48										
49										
50	SAND, grayish brown (2.5Y5/2), wet, medium to coarse grained, well graded, dense	SW				SS11/ 1103				Install monitoring well 20' of 2" pvc #6 slot screen 35' PVC casing filter pack to 25' bgs tremied aquagel gold to gs
51			18/ 26/ 26/ 22	1.3/ 2.0						
52	(TOTAL DEPTH= 52.0 FT)									T.D.=52.0' ft. 1115 - 07/12/94

BZ=Breathing Zone BH=Bore Hole S=Sample

Drill Rig	Notes
N	Consultant
M	NCI
C	Geotech
G	AS

# BORING LOG

PROJECT NAME Harcros Chemicals Inc  
 PROJECT LOCATION 5200 Speaker Rd KCK  
 LOGGED BY J. Fisher (URS) DRILLED BY D. Loretz - 175  
 SURFACE ELEVATION ELEVATION DATUM  
 GROUND WATER Global observation  
 OBSERVATIONS allowed natural materials to collapse around Screen

MW - 375

SHEET 1 of 2  
 PROJECT NO. 49C200100700  
 TASK NO. 03223  
 DATE 4-9-02  
 RIG Geoprobe 6610 DT

DEPTH, ft.	SAMPLE					DESCRIPTION Consistency (Relative Density), moisture, color, Modifier, SOIL TYPE, USC, (Origin)	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	ROD LENGTH	REC/RQD	PP, KSF			
0						Asphalt		Probe advanced w/ 2 1/8" O.D rods
10								
20								sch 40 PVC 0.010 slot screen
30								2' bgs top of cement-bentonite
40								grout
50								Driller noted very hard materials

FIELDLOG  
 MW - 375  
 49C200100700  
 03223  
 4-9-02  
 Geoprobe 6610 DT  
 175  
 J. Fisher (URS)  
 Global observation  
 allowed natural materials to collapse around Screen  
 Probe advanced w/ 2 1/8" O.D rods  
 sch 40 PVC 0.010 slot screen  
 2' bgs top of cement-bentonite  
 grout  
 Driller noted very hard materials  
 Bottom of grout  
 45' bgs  
 Natural Material  
 (Sand's)  
 48' bgs  
 Top of Screen

# BORING LOG

PROJECT NAME Harcros Chemicals, Inc.  
 PROJECT LOCATION 5200 Speaker Rd KCK  
 LOGGED BY J. Fisher (URS) DRILLED BY D. Lovett - I.P.S  
 SURFACE ELEVATION \_\_\_\_\_ ELEVATION DATUM \_\_\_\_\_  
 GROUND WATER \_\_\_\_\_  
 OBSERVATIONS \_\_\_\_\_

MW - B75

SHEET 2 of 2  
 PROJECT NO. 49(2001)00700  
 TASK NO. 03223  
 DATE 4-9-02  
 RIG Geoprobe 6610 DT

DEPTH, ft.	SAMPLE					DESCRIPTION Consistency (Relative Density), moisture, color, Modifier, SOIL TYPE, USC, (Origin)	SYMBOL	ELEVATION	FIELD NOTES Used 1" Sch 40 PVC casing w/ sch 40 PVC 0.010 slot screen 52'-55' bottom of screen 52'-54' natural material (sands)
	TYPE	RECOVERY	ROD LENGTH	REC/RAD	RESISTANCE PP, KSF				
50									
60									

FIELDLOG

**URS**